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## Foodborne Disease Outbreaks, Annual Summary, 1982

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## Introduction

Foodborne disease surveillance has traditionally served three objectives:

1. Disease Prevention and Control. Early identification and

removal of contaminated products from the commercial market, correction of faulty food preparation practices in food service establishments and in the home, and identification and appropriate treatment of human carriers of foodborne pathogens are the main prevention and control measures that result from surveillance of foodborne disease.

- 2. Knowledge of Disease Causation. In over half of the foodborne disease outbreaks reported to CDC in each of the last 5 years, the responsible pathogen was not identified. In many of these outbreaks, pathogens known to cause foodborne illness may not have been identified because laboratory investigations were late or incomplete. In others, the responsible pathogen may have escaped detection even after thorough laboratory investigation, either because the pathogen may not have been recognized as a cause of foodborne disease or because the pathogen could not be identified by available laboratory techniques. When more thorough clinical, epidemiologic, and laboratory investigations are conducted, perhaps many of these pathogens can be identified, and suitable measures for prevention and control can be instituted.
- 3. Administrative Guidance. The collection of data from investigations of foodborne disease outbreaks permits the assessment of trends in the prevalence of etiologic agents and in vehicles of disease transmission. In addition, it brings to light common errors in food handling. Compiling and publishing annual data will enable local and state health departments and others involved in the implementation of food protection programs to be kept informed of the factors involved in foodborne disease outbreaks. Comprehensive surveillance should result in a greater awareness of the most important food protection methods, the institution of better training programs, and more effective use of available resources. Methods

Definition of Outbreak. For the purpose of this report, a foodborne disease outbreak was defined as an incident in which 1) two or more persons experience a similar illness after ingestion of a common food,

and 2) epidemiologic analysis implicates the food as the source of the illness. A few exceptions exist; for example, one case of botulism or chemical poisoning constitutes an outbreak.

Outbreaks of known etiology are those for which laboratory evidence of a specific agent is obtained and specified criteria are met. Outbreaks of unknown etiology are those for which epidemiologic evidence implicates a food source, but adequate laboratory confirmation is not obtained.

Source of Data. Outbreaks are reported to CDC on a standard reporting form. Reports come most frequently from state and local health departments; they may also be received from Federal agencies such as the Food and Drug Administration (FDA), the U.S. Department of Agriculture (USDA), the U.S. Armed Forces, and occasionally from private physicians. Forms are reviewed at CDC to determine whether a specific etiologic agent for the outbreak can be confirmed and, in some instances, questions about an etiologic agent may be referred back to the reporting agency. Otherwise, data are accepted as reported.

Interpretation of Data. The limitations on the quantity and quality of data presented here must be recognized in order to avoid misinterpretation. The number of outbreaks of foodborne disease reported by this surveillance system clearly represents only a small fraction of the total number that occur. The likelihood of an outbreak's coming to the attention of health authorities is dependent on consumers' and physicians' awareness, their interest, and their motivation to report the incident. For example, large outbreaks; interstate outbreaks; restaurant-associated outbreaks; and outbreaks involving serious illnesses, hospitalizations, or deaths are more likely to come to the attention of health authorities than cases of mild illness following a family cookout.

The quality of the data presented here depends upon the commitment to surveillance of this type of disease by state or local health departments. A department's interest in foodborne disease, its investigative capabilities, and its laboratory facilities are important determinants of the quality of the investigation. Furthermore, the likelihood that the findings of the investigation will be reported varies from one locality to another. This report, then, should not be the basis of firm conclusions about the absolute incidence of foodborne disease, and it should not be used to draw conclusions about the relative incidence of foodborne diseases by specific causes. For example, foodborne diseases characterized by short incubation periods, such as those caused by a chemical agent or staphylococcal enterotoxin, are more likely to be recognized in common-source foodborne disease outbreaks than those diseases with longer incubation periods, such as hepatitis A. Outbreaks involving less common pathogens, such as Bacillus cereus, Escherichia coli, or Giardia lamblia are less likely to be confirmed because these organisms are often not considered in clinical, epidemiologic, and laboratory investigations of foodborne disease outbreaks. Also, since laboratory methods for confirming viral disease are not widely available, many outbreaks of foodborne illness due to viruses probably fall into the "unknown etiologic agent" category. Pathogens that generally cause mild illness will be underrepresented, while those causing serious illness, such as Clostridium botulinum, are more likely to be identified. Similarly, restaurant- or commercial-productassociated outbreaks have a higher likelihood of being reported. Results

In 1982, 656 outbreaks (19,380 cases) of foodborne disease were reported to CDC. Reports were received from 39 states as well as from the District of Columbia, the U.S. Virgin Islands, Guam, and Puerto Rico (Figure 1). New York reported the largest number of outbreaks (323), with 160 from New York City; Washington reported the next largest number of outbreaks (44), followed by California (35).

The etiologic agent was confirmed in 34% of the outbreaks (11,050 cases) (Table 1). Bacterial pathogens accounted for 151 outbreaks (5,501 cases). The most frequently isolated bacterial pathogen was Salmonella (55 outbreaks, 2,056 cases), followed by Staphylococcus aureus (28 outbreaks, 669 cases) and Clostridium perfringens (22 outbreaks, 1,189 cases). During 1982, two outbreaks (one in Oregon and one in Michigan) of a previously unrecognized pathogen, E. coli O157:H7, were investigated. Both outbreaks were associated with eating hamburger from the same fast-food restaurant chain. The illness was characterized by bloody diarrhea, abdominal cramps, and low-grade or absent fever. Since it was first described, this pathogen has also been associated with non-bloody diarrhea and a spectrum of clinical

illnesses, including hemolytic-uremic syndrome. Viral agents (hepatitis A and Norwalk virus) accounted for 21 outbreaks (5,325 cases). The high number of cases resulting from viral agents is predominantly due to two large outbreaks of Norwalk gastroenteritis that occurred in Minnesota. One outbreak involved 3,000 cases and was related to eating bakery items with frosting. The second involved 2,000 cases and was associated with eating cole slaw. Chemical agents were responsible for 47 outbreaks (220 cases). Only one outbreak, involving four persons with Trichinella spiralis, was attributed to a parasitic agent. Twenty-six deaths were associated with foodborne diseases in 1982: 11 from Vibrio cholerae O1 (all in Guam and the Trust Territories), eight from Salmonella, five from C. botulinum, and two from unknown causes. No pathogen was identified in 436 of the outbreaks (8,330 cases) reported in 1982.

Incubation periods were known for illnesses in 412 of the outbreaks. In 13 outbreaks, the incubation period was less than 1 hour; in 123 outbreaks, it was 1-7 hours; in 91 outbreaks, it was 8-14 hours; and in 185 outbreaks, it was 15 hours or more.

The food vehicle of transmission was determined in 168 (76%) of the 220 outbreaks in which a pathogen was identified (Table 2). For diseases caused by bacterial pathogens, meat or dairy products were the vehicles of transmission in 52% of the outbreaks in which the vehicle was known. For diseases caused by chemicals, fish or shellfish were the vehicles of transmission in 57% of the outbreaks. Food eaten in a restaurant was associated with 44% of outbreaks, and food eaten at home, with 30% (Table 3). The proportion of foodborne illness due to known etiologic agents was higher in the summer months than at any other time of year (Table 4). Discussion

The inconsistency in reporting can be seen by looking at the distribution of outbreaks by state. A few states, such as New York and Washington, reported a disproportionately large number of outbreaks. For example, New York State and New York City reported 323 outbreaks, almost one-half of those reported for the entire United States. While it is possible that states such as New York and Washington have a higher rate of foodborne disease, it is more likely that these figures simply represent differences in surveillance activity. The same inconsistency can be seen when looking at outbreaks by pathogen. CDC data show that C.botulinum is as common a foodborne pathogen as Campylobacter jejuni and Vibrio parahaemolyticus, a finding that indicates only that botulism is reported more comprehensively than some other pathogens.

The number of outbreaks of foodborne disease of confirmed etiology that were reported to CDC over the last 5 years has remained relatively constant. The distribution of cases by etiologic agent has also remained fairly consistent. Etiologic agents typically have been confirmed in about 40% of all outbreaks. When etiologic agents have been confirmed, bacterial pathogens have consistently accounted for approximately two-thirds of the outbreaks, and chemical agents for an additional 20%-25%.

Many food preparation practices contribute to foodborne disease (Table 5). In 1982, the five most common practices, in order of frequency of occurrence, included 1) improper holding temperature, 2) food from an unsafe source, 3) inadequate cooking, 4) poor personal hygiene on the part of food handlers, and 5) contaminated equipment. In most of the outbreaks caused by bacterial pathogens, the food had been stored at improper holding temperatures. In outbreaks of botulism or trichinosis, the food had usually been inadequately cooked. In outbreaks of ciguatera and mushroom poisoning, the food itself was unsafe, and illness was not related to improper handling or preparation.

The large number of outbreaks in which no pathogen was identified points out the need for the improvement of investigative skills so that known pathogens can be identified more frequently, and new and as-yet-unidentified pathogens can be recognized.

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